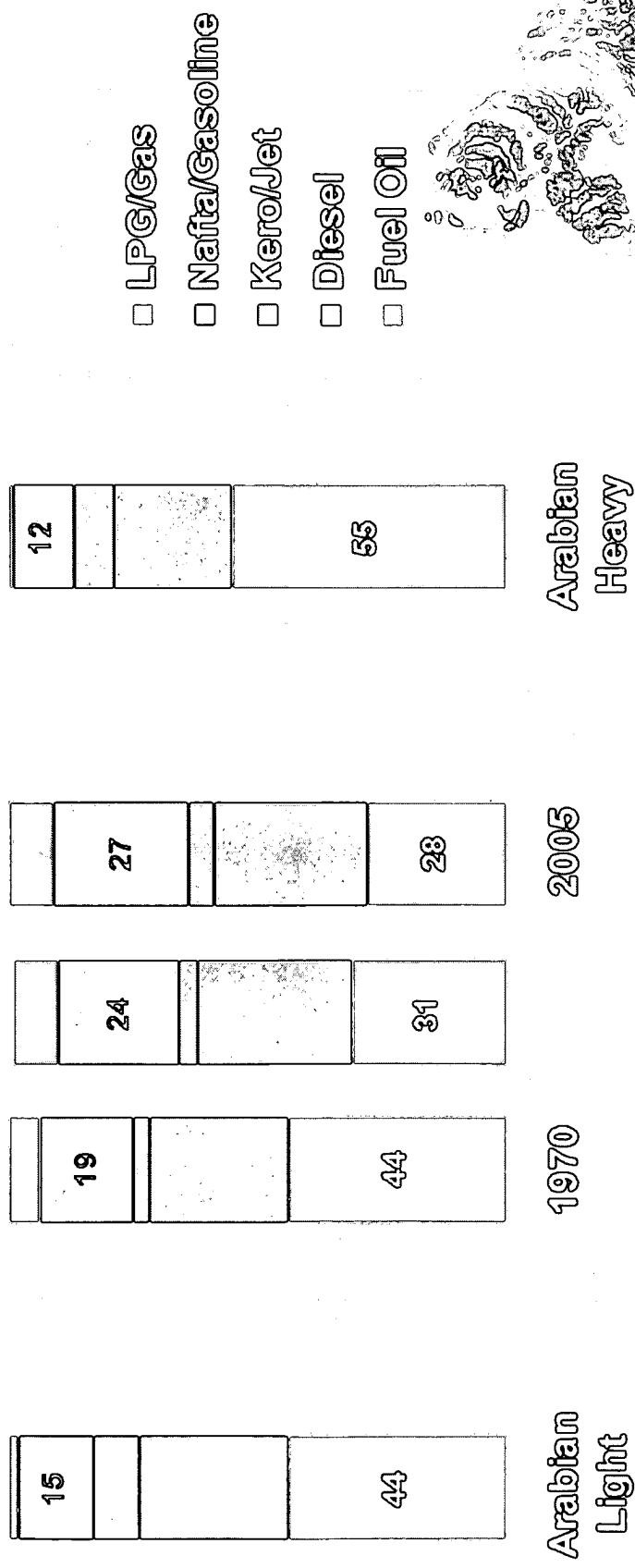
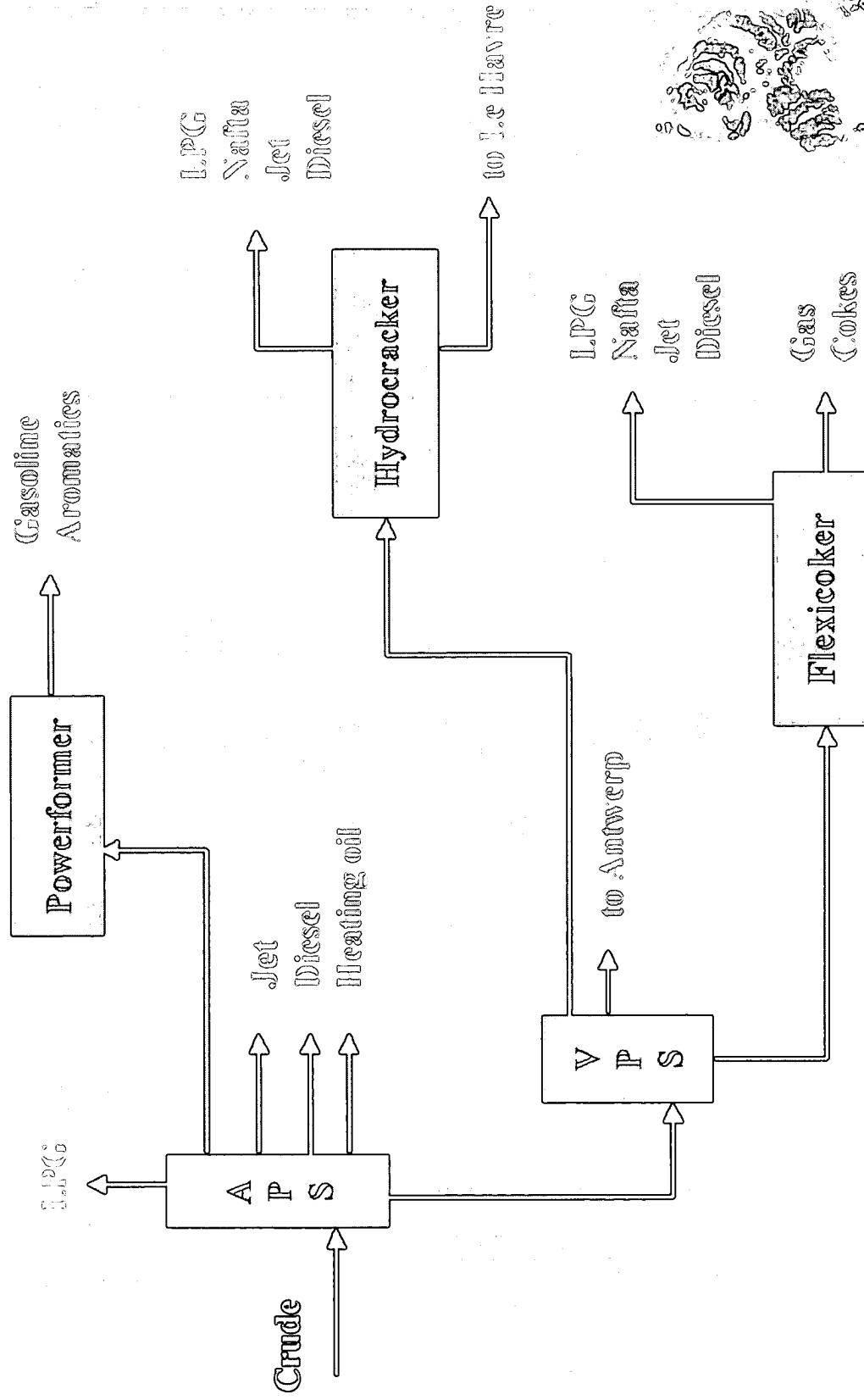


Market demand and crude oil supply



ESSO Rotterdam Refinery



Vacuum Residue Conversion Processes

Considerations:

- Market demands for light products
- Environmental legislation for cleaner products
- Stricter regulations on refinery emissions
- Vacuum residue contains a lot of carbon and little hydrogen but also 3-5% sulphur, nitrogen and metals like vanadium and nickel



Vacuum Residue Conversion Processes

Two routes for vacuum residue conversion :

- Hydrogen addition processes : Residfining, Hycon
 - ◆ high temperature, high hydrogen pressure
 - ◆ rapid catalyst deactivation requires large reactors or moving catalyst
 - ◆ sensitive for metal contaminants
 - ◆ products do not need any further treating
- Carbon rejection by thermal cracking : Delayed Coking, FLUID and FLEXICOKING
 - ◆ high temperature, low pressure, no hydrogen
 - ◆ no catalyst, abundant coke
 - ◆ insensitive to contaminants
 - ◆ low refinery SO₂ emissions
 - ◆ products need after treatment in conventional hydrotreaters

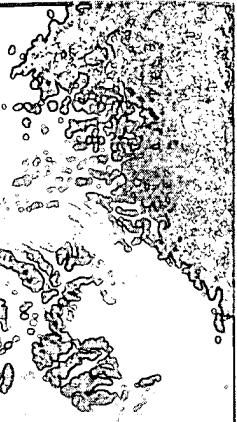
Flexicokers

All build 1980 - 1990, investment > 1 billion \$\$

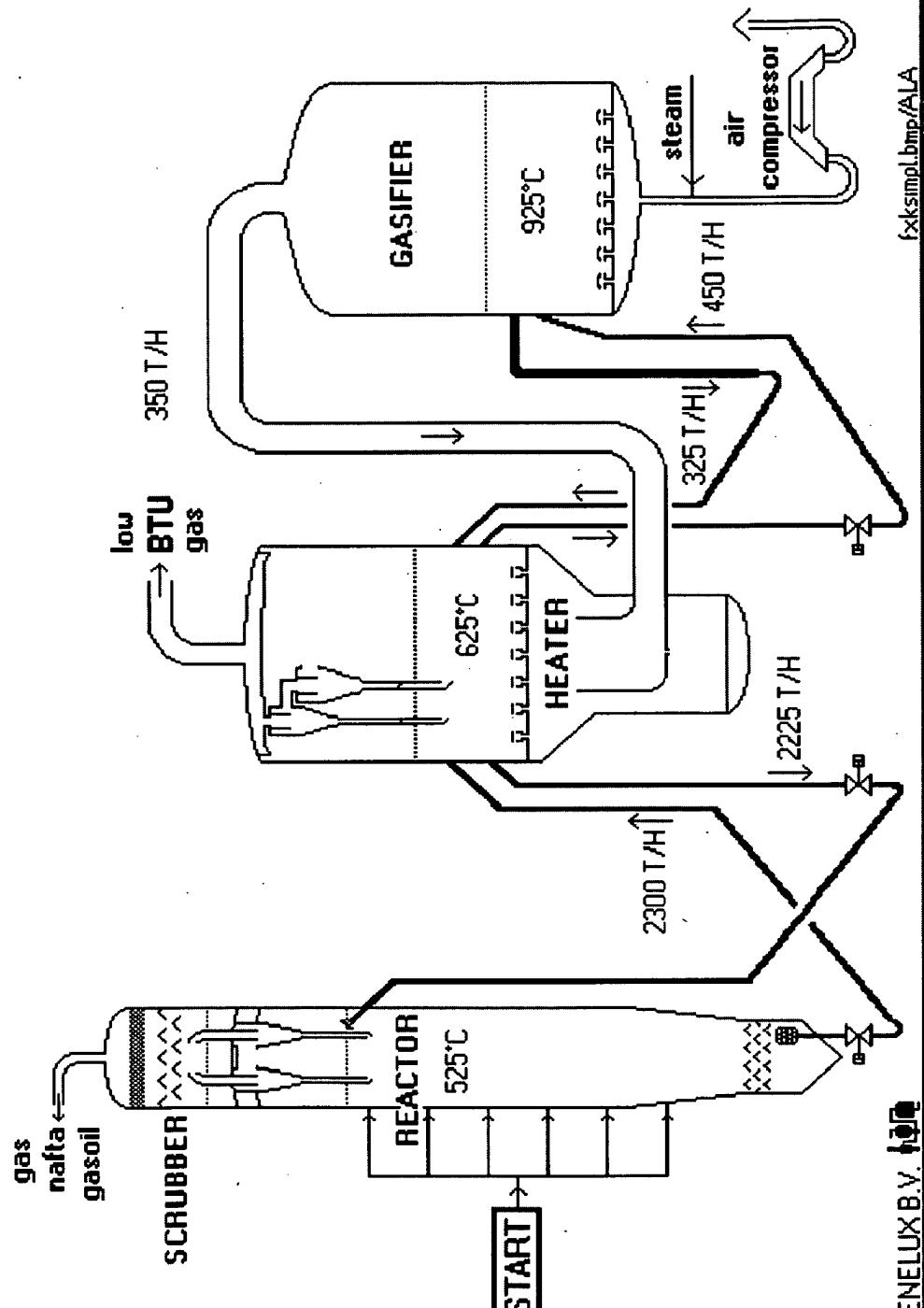
Rotterdam	NL	ExxonMobil
Baytown	USA-TX	ExxonMobil
Martinez	USA-Ca	Shell
TOA	Japan	State-owned
Amuay	Venezuela	State-owned

Why only 5 Flexicokers in the world ?

- ◊ Initial investment
- ◊ Mechanical cost (mainly in Turnaround)
- ◊ Runlength



SIMPLIFIED FLEXICOKER PROCESS



ESSO-BENELUX B.V.

